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8/4/17

OU7 ISSUES SUMMARY
EPA comments (3/31/17), **ARC response** (6/27/17), **technical discussion** (8/3/17)

EPA comments in blue.
[ARC RESPONSES in brackets].
Additional work performed by ARC indicated in red.
Agency notes in green.
Tech meeting notes in purple, **follow-up items bolded.**

CATEGORIES of Topics:
A. Agriculture
B. Background
C. Dredge material on road #5 (p.5). — *no further discussion needed, but note that RTC indicated extensive analysis of nitrate & sulfate performed.* **Need to see analysis.**
D. Further investigation #10 (p.7), #23 (p.14). — *interrelated with agriculture and background issues.*
E. General #11 (p.8), #14 (p.10), #18 (p.13). — *no further discussion needed.*

A. Agriculture

2. (p.2) – **[XRF at T6]**. T6 XRF result says signature of mine impact, WDB-10 analytical result exceeds bg for As, Fe. [ARC RESPONSE - XRF is screening tool, higher variability, lower accuracy, greater confidence in lab analytical. Iron only slight exceedance, heterogeneity, within bg with slight deviation]. Note 6" increments with XRF, but lab sample was 0-6", then 6"-24" (an 18" increment). XRF smaller increments than analytical samples. Lab data was J flagged too. XRF provides more depth specific detail. Corresponding lab sample can dilute the higher concentrations found in shallow increment. **Don: follow-up, will take a look, review, consider.** Roseberry: do see other variability but feel analytical results capture variability well. McMillan: disagree, looking for thin deposits. Hint of it in photos of sample too.

3. (p.2) – **[General Ag Analysis].** WDB-10 exceedance of bg cannot be solidly concluded as being ag impact.
6. (p.2) – Highly unlikely ag major contributor given estimate volume of impacted gw and U mass in gw.
7. (p.3) – Little specificity to link Table 7-5 to conclusion of ag loading. (Fertilizer/amendment grab samples).
9. (p.3) – repeat of #3.
[3, 6, 7, 9 ARC RESPONSE - Ag influence identified by spatial patterns. Nitrate increase exponentially with distance from mine. Nitrate stratified, highest at surface of drain, systematically decreases with depth. Nitrate is ag fertilizer, no mine source. Pattern similar for organic carbon. Chemicals from copper deposit (copper, arsenic iron, selenium, nickel, radium) trends are: decrease from mine to Luzier; increase from Luzier north; clear decrease with depth in area north; higher sulfate, iron and zinc measured in fertilizer and amendments.   Regarding U, fertilizer and soil amendments increases soil alkalinity which mobilizes naturally occurring Uranium in soil.   ARC continues to analyze geochem effects of ag practices on drain. Strong correlation between organic carbon and Cu, U concentrations. Organic carbon increases northward. Molar ratios of iron, sulfate and org carbon closely match ratios in soil amendment. Long-term ag runoff increases organic content in drain. Organic enrichment increases adsorption onto sediment particles of Cu, U]. **Need to see analysis.**
Dietrick: explosives with nitrate were used at mine. Don: analysis is in 3 places – report, slides, and

RTC. Can get together and discuss at tech mtg. Dietrick: analysis applies to defining background. **Next step - agencies to look at that info, 3 pieces, ask questions, meet and discuss.** McMillan: there are analyses cited that aren't presented.

8. (p.6) – [T5]. T5 analytical and XRF results, added observations, somewhat elevated copper in 0-0.5 ft in T5-W100 to T5-E100; copper XRF exceeded at T5-W100 to T5-E100 at 0-0.5 ft and 0.5-1.0 ft. At T5-E10 in 6.5 ft reflects historic drain bottom, elevated copper in top foot not necessarily ag because shallow copper in T5-E500 and E1000 are not similarly elevated.

15. (p.6) – XRF results, T5 elevated in upper 2 feet, spikes in Fe, As at 7 ft, report asserts shallow elevated copper not mine-related, but observe copper in shallow soil peaks in vicinity of drain and are lower to east.

[8, 15 ARC RESPONSE - T5 shallow elevated copper interpreted to have surface source because concentrations systematically decrease with depth, and former drain bottom concentrations are less than surface, and high surface concentrations of no other COIs are seen. Although elevated copper not observed in shallow soil of other parts of transect, they all correlate with organic carbon.]. Surface source conceptually could've been from drain bottom. Agree on observations, but disagree on interpretation. **Next step - item for tech mtg.**

13. (p.10) – [Ag Signature]. Developing ag signature would be useful. Could base on locally used ag chemicals, offer hypothetical typical return water characteristics, need be time-based, analyze ag chem compositions, application rates, analyze fate and transport of each chem. [ARC RESPONSE - Studying ag influences would be convoluted.]. Report references ag impacts significantly, we need to distinguish from mine impacts. **At least do literature search.** CBI found resources. Also utilize ag samples from Phase 1 and from YPT. Don: see what CBI sources are. Jack: happy to discuss with CBI. **Next step - ARC get info from CBI.**

B. <u>Background</u>

4. (p.4) – too few molybdenum detects for bg, too many selenium non-detects. [ARC RESPONSE - Earlier bg report had fewer. ProUCL tech guide says 10 observations min needed, we had 3x more than that]. JC: excessive NDs does affect data set, affects ability to run certain statistical tests. John will check with Shireman (CBI statistician). Keep on table – possibly **discuss on phone?** Don: need statistician on line.

12. (p.8) – near-surface values could be elevated from aerial deposition? Also consider Chebyshev UCL on near-surface without deeper values, rationale of sediments in streambeds normally representing surface soils surrounding it. [ARC RESPONSE - ARC evaluated data for aerial deposition trends. Chebyshev UPL used, not UCL. ARC evaluated shallow versus full depth]. Shireman also calculated it several ways, didn't make huge difference. **Need to see analysis. Don: tabulated it, could present and share. Follow-up.**

16. (p.11) – In Table 4-2, highlight constituents exceeding BCL, so one can see clusters. [ARC RESPONSE - ARC presentation is sufficient]. **Want to have it done**. It will help reviewers evaluation the data. **Don: can't commit but will take it to Jack.**

17. (p.11) – Need to statistically support having north and south areas, like previous bg study, <u>2-sample hypothesis test</u>, verify areas are statistically different. **Want to have it done.** It will demonstrate they are 2 data sets. Soil type maps are for farmers, show different soil types, but could

be same mineralogically. **CBI: will confirm whether want 2-sample test to be depth-specific or full-depth.** Dietrick: prefer depth-specific. Alma: in addition to soil type, surrounding land use also affects soil in two areas. **Don: will take to Jack, will talk to statistician, see if he agrees with value of task.**

19. (p.11) – Use elemental scatter plots of metals with similar geochem behavior, to discriminate between native samples and contaminated. Regarding 90% Chebyshev UPL, better to use upper bound appropriate to distribution.

20. (p.12) – evaluation of geochemical association of metals may indicate correlation(s) and identify range of bg, helping distinguish true bg from contamination. Plot different metals in groups, get signature patterns. #19 and 20 would demonstrate bg is distinct from contaminated soil. Get signature for mine this way. Might also help distinguish mine from ag. **Don: will have to discuss with statistician.** Dietrick: some ag soil could have been impacted by the mine where irrigated with contaminated groundwater. McMillan: anthropogenic influences on bg. Dietrick: propose further discussion of bg on separate call or meeting.

[17-20 ARC RESPONSE - Different soil types justifies having 2 bg areas without statistical testing. 90% Chebyshev UPL used for consistency with 2009 bg report. Can over-predict, but compensate with lower confidence level, 90 vs. 95. Did evaluate other statistical approaches but didn't alter overall interpretations]. **Need to see analysis.** Pertains to UPL v. UCL issue. Shireman also ran other approaches and confirmed it didn't alter significantly.

21. (p.13) – in addition to visual screening conducted, make eval more robust by using ProUCL outlier identification function or a statistical method in a spreadsheet program. [ARC RESPONSE - Visual identification is acceptable method, per EPA guidance, but they did do it to compare]. **Need to see analysis. Don: will check with Jack on providing.**

22. (p.14) – did they compare our background values with USGS regional data? [ARC RESPONSE - Will consider doing, but north area is anthropomorphically affected]. EPA wants to see this comparison. Understand intent is for north bg area to represent an "agriculturally impacted background." **Don: will consider.**

NOTES FROM TECH CALL DISCUSSION RE: PHASE 1 RISK ASSESSMENT:
Alma: since 6/3, looking to revise CSM, reading Cultural Resources Report and other resources re: tribal exposure. Haven't progressed since, working on schedule, lead changes, etc. Not at point yet where ready to get Ginny's input, but will do.
Jeryl: not yet known who NDEP will use for HRA tech support, RFP to go out this fall, are requiring health risk assessment expertise, could be a team, expect to get contract in place by Jan 1. Can we make progress between now and then? Jeryl himself will be involved throughout so we can make progress.
Jeryl: NDEP may be able to tap into alternate technical support contract in interim before get new contract assistance on board.
Jack: can progress on discussing tech issues.